PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G02B 3/00, B29D 11/00, C03B 19/09, G02C 7/02

A1

(11) International Publication Number: WO 99/13361

(43) International Publication Date: 18 March 1999 (18.03.99)

(21) International Application Number: PCT/EP98/05613

(22) International Filing Date: 4 September 1998 (04.09.98)

(30) Priority Data:
MI97A002047 9 September 1997 (09.09.97) IT

(71)(72) Applicant and Inventor: BIANCO, Graziano [IT/IT]; Via Maroni, 14, I-21056 Induno Olona (IT).

(74) Agent: GERVASI, Gemma; Notarbartolo & Gervasi S.p.A., Corso di Porta Vittoria, 9, I-20122 Milan (IT).

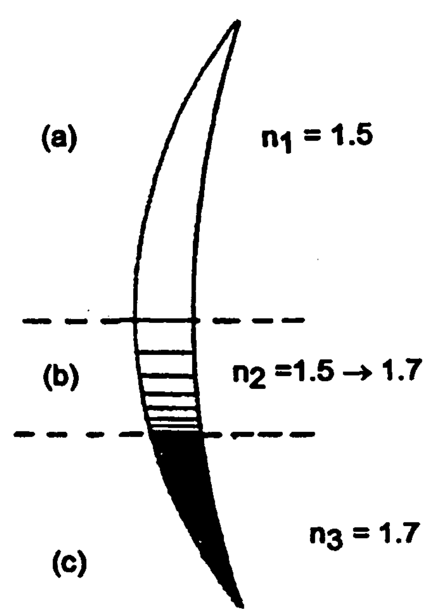
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: PROGRESSIVE, MULTIFOCAL OPHTHALMIC LENS HAVING CONSTANT GEOMETRY AND VARIABLE REFRACTION INDEX

(57) Abstract

Progressive, multifocal ophthalmic lens, characterized by the fact of having more optical areas among which the dioptric progression one is made of an optical material having a variable refraction index so that this progression area starting by an end having the refraction index value of the material forming the lens in the far sight area progressively reaches at the other end the refraction index of the material forming the lens in the near sight area, thus obtaining, when the lens surface is shaped according to monofocal curves, the following three optical areas: an optical area (a) having dioptric value for far sight, an optical area (c) having dioptric value for near sight, an optical progression area (b), placed between the far sight and the near sight, in which progression area the dioptric value changes from the far sight value to the near sight value owing to the continuous variation of the refractive index.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania
AM	Armenia
AT	Austria
AU	Australia
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CU	Cuba
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GH	Ghana
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IL	Israel
IS	Iceland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakstan
LC	Saint Lucia
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
MK	The former Yugoslav Republic of Macedonia
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TM	Turkmenistan
TR	Turkey
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam
YU	Yugoslavia
ZW	Zimbabwe

PROGRESSIVE, MULTIFOCAL OPHTHALMIC LENS HAVING CONSTANT GEOMETRY AND VARIABLE REFRACTION INDEX.

Field of the invention

The lens object of the present invention is defined as a constant geometry, progressive, multifocal, ophthalmic lens having variable refraction index.

This is a completely new and revolutionary lens in comparison to the ones presently manufactured for the same use.

It shows advantages and considerable improvements, as described further, on both from the optical point of view - the image's peripheric distortion areas are almost completely removed; it allows the greatest visual comfort, etc. - and from the technical manufacturing one - in fact the optical working of said lens is greatly simplified with a consequent knocking down of production costs.

Before describing the features of the lens of the present invention, it is described what a progressive, multifocal lens is and the present known concepts for its manufacture.

State of the art

The progressive, multifocal lens (Fig. 1) is conceived for the visual correction of presbyopia.

This means that it is a lens allowing corrections with different diopters for far sight and near sight.

Moreover, this lens has an intermediate optical area between the far sight and the near sight wherein the diopter is progressively and variably increased from the far sight degree to the near sight degree in order to allow a good sight for intermediate distances too.

Said lens is the improved version of the bifocal one (Fig. 2) wherein the "upper" area of the lens shows the diopter for the far sight and the "lower" one the diopter for the near sight.

In said lens the long-sighted person can clearly see from far and from near at a reading distance but it is impossible to have the same clear sight for the intermediate distances.

Before the invention of the progressive, multifocal lens, the trifocal ones have

been invented (see Figure 3).

They have a small intermediate area *i* between the far sight area and the near one to allow the sight even at an intermediate predetermined distance but they do not allow a good sight in variable progression.

The progressive, multifocal lenses, which are presently manufactured, have the previously described features but they show limited performance and have unavoidable non-functional great optical areas wherein there are the alterations which do not allow a clear peripheral sight, particularly in the near sight.

This is the unavoidable consequence of the present construction technology, even though all possible trials to reduce at most such non-functional areas of the lenses have been made.

In fact the progressive multifocal lenses, as all the other lenses included the monofocal ones, which are presently produced, are obtained from a glass or other optical material disk (rough block), which is homogeneous in refraction index in all its bulk. It is glass at constant "gradient".

So, in order to obtain a constant dioptic progression from far to near, it has been necessary the construction of a lens having a "variable geometry", that means by employing different curving rays for far and for near and with intermediate curving rays in constant progression in order to join up the area with the curving ray from near.

This working process is consequently very complex and it needs a complicated technology, heavily affecting the production costs.

Nonetheless in the multifocal progressive lens thus produced (Fig. 4) it is technically impossible to obtain variable progression curves which are constant all over the lens surface.

In fact, this lens shows a quite good optical area for the far sight, even though this area incidentally shows some distortions too, but, on the contrary, the useful near sight area is necessarily very limited and it changes according to the manufacturing companies and to the kind of progressive lens produced, said area does not change much but this change is always in the order of few millimetres.

Moreover, the intermediate sight area, that means the progression one, is the

most penalized, in fact, this area is good in an "optical channel" whose side width is not larger than one millimetre.

Moreover, these lenses owing the above described features, during the cutting phase, in order to be put into the glass frame, need an almost perfect "blocking" in comparison to the interpupillary distance of the bearer, otherwise they cannot be used.

Moreover even though the assembling process is perfectly carried out, the limited useful optical areas of the same lenses causes considerable inconveniences in the near sight and a good deal of patience is required to bearers in order to get used to the glass.

Brief Description of the Figures

Figure 1 shows a progressive multifocal lens wherein the areas having different dioptric values are represented.

Figure 2 shows a bifocal lens having the upper area for far sight and the lower area for near sight.

Figure 3 shows a tri-focal lens having a small intermediate area *i* between the far sight and the near sight areas.

Figure 4 shows a progressive multifocal lens having "variable geometry".

Figure 5 progressive, multifocal lens having three optical areas with different refractive index and constant geometry.

Figure 6 Rough-block having three different optical areas

Figure 7 Graphic representation of the distribution of granules A and B in the progression area, i.e. intermediate area (b), wherein:

● ■ black granules, material A, index n_1

▨ ▨ grey granules, material B, index n_3

Figure 8 Device for the variable progression composition of the granules of A and B material, wherein:

A hopper for material A (having refraction index n_1)

B hopper for material B (having refraction index n_3)

F feeding devices

M mixer, C container for the settled mixture granules having variable progression.

Figure 9 Diagram feeding speed/material quantity versus time:

v_A= rotating feeding device speed for material A

v_B= rotating feeding device speed for material B.

Figure 10 Apparatus for merging granules, wherein:

1 = Autoclave

2 = Thermocouple

3 = Melting pot

4 = Granules

5 = Resistance

6 = Vacuum-control manometer

7 = Vacuum pump

8 = Continuous current feeder

Figure 11 Possible additions of the dioptric value in function of the dioptric values for sight from far.

Detailed description of the invention

The lens object of the present invention, which is called "MIV" (Fig. 5) i.e. progressive, multifocal lens having variable refraction index and constant geometry, shows the peculiarity of being obtained from a glass or other optical material rough block having different refraction indexes in the zones corresponding to the three sight areas: an n_1 for the far sight area (for instance 1.5), and n_3 for the near sight one (for instance 1.7) and in the intermediate dioptric progression area a variable index n_2 which changes in constant progression from the far sight value to the near sight one. The above mentioned examples refer to "positive" lenses, that means to lenses in which the dioptric value from near is higher than the one from far. In the case of "negative" lens wherein the dioptric value from near is lower than the one from far, the refraction indexes are put with the inverted values: that means the greater index upward and the smaller one downward with the progression area in which the index progressively decreases from the greater value to the smaller one.

In practice, the dioptric progression is not generated any more by variable

geometry but by the same composition of the optical material.

In fact a lens made from a rough block having these features and employing constant geometry curves, such as the traditional curves, i.e. an internal spherical concave curve and an external spherical convex curve for the construction of a spherical meniscus, will show the features of the progressive multifocal lens but it will not have the limits of the multifocal ones which are presently produced, that means that the useful area will be there on all the lens surface and on all its portions: far sight area, progressive intermediate sight area and near sight area.

The process in order to obtain these rough blocks is described here below.

It is confirmed that from this kind of rough block the progressive lens is obtained by working both the internal basis and the external one with constant geometry surfaces that means in the same way in which the monofocal lenses are manufactured as it is just the different refraction index in the different points of the material itself that causes the dioptrical progression.

The features and the advantages of this lens can be thus summarized:

- useful sight all over the lens surface in the far sight area, in the near sight area and in the intermediate area of dioptric progression.
- Production costs are knocked down, as the manufacturing process is similar to the one of the monofocal lenses.

<u>Manufacturing process of the rough blocks in order to obtain constant geometry, "MIV" multifocal progressive lenses having an intermediate dioptric progression area made of a material having variable refraction index.</u>

For the manufacturing of the progressive multifocal lenses having variable refractive index as previously described, it is necessary to start with a rough-block made of glass or other optical material in which block there are three areas having refractive indexes different from each other. The rough-block has a cylindrical shape: Fig. 6 shows the upper face of the block with the three areas (a), (b) and (c).

If it is necessary to obtain a "positive" lens, the upper area (a) must show a low refraction index (for instance 1,5) the lower area (c) a high refraction index in relation to the "addition" to be obtained (for instance 1,7) while the intermediate

area (b) must show a constantly changing downward refraction index starting from the lower index (i.e. 1,5), in the upper area (a), until the higher index (i.e. 1,7), of the lower area, is reached in constant progression.

The width of these three areas must be determined according to the functional features the lens should have. The progression area's width should be set according to the use to which the lenses are intended to, for example: wide or limited sight area at the intermediate distances between far and near.

The quantification of the refraction indexes to be employed must be determined from time to time according to the final diopters the lens must have: diopters from far and amount of the addition for near.

Furthermore you have to taken into consideration also the kind of lens you want to obtain: for example, if a lens is needed with a high index for the thickness reduction or a lens having a normal thickness for low diopters, and so on.

As described above, there are usually three or four or more optical areas for particular needs; one of these is a variable progression one.

The "MIV" lenses object of the present invention have all the functional features of the present progressive lenses, that means correct sight from far, in the progression are and from near, but they do not show the marginal areas of astigmatic aberrations, that means that they offer a complete sight area all over the lens surface; moreover, they are manufactured by forming monofocal surfaces in the rough block both in the outer and in the inner part.

Thanks to the working simplicity of this process, production costs are remarkably reduced.

The range of possible manufacturing of the "MIV" progression lenses is shown in the chart of Fig. 11, in which, as an example, two kinds of extreme refraction index glass are considered, that means two kinds of glass having respectively 1,5 and 1,9 refractive index.

The possible additions can be also calculated by using combinations of different indexes, for example 1,5 with 1,8/1,6 with 1,8/1,6, with 1,9, etc.

The result of the calculations with the suitable formulas of the resulting diopters taken from a rough block having the above mentioned composition, in this case

with 1,5 and 1,9 refraction indexes and considering that the curves produced have a constant geometry, as in the monofocal meniscuses, the range of possible additions is obtained.

As it is shown, with low dioptric values for sight from far, low additions are obtained but the higher the dioptric value from far is, the broader the addition range is.

It is impossible with this kind of variable refraction index lenses to obtain high additions with low diopters from far; nevertheless this limit is greatly compensated by the possibility of having the total range of additions when the diopter is quite high.

It is indeed with the high diopters that the variable geometry traditional progressive lenses show the greatest drawbacks such as the utmost reduction of the sight area, increased areas with side astigmatisms, etc.

If desired, the range of additions can be bridged, in case that is impossible by the sole variable refraction index, also by manufacturing said lenses with a variable refraction index material rough block, as described above, and forming variable geometry curves as the traditional progressive lenses thus obtaining the result of having far higher performances in comparison to these latters, because the lens, having different indexes in the different areas, will allow to reach the desired addition by using much less differentiated curves between the far sight and the near sight with a reduction of the aberration area and an increase of the useful sight area.

The "MIV" lens manufacturing process is now described.

The materials employed to manufacture the variable refraction index rough block must have melting characteristics compatible between them.

In order to produce the rough blocks, the starting materials must be in granules.

The final result of the merging of the two glasses or other optical materials, having indexes n_1 and n_3, in the progression area, is shown in Fig. 7.

In said picture, in order to further clarify the above mentioned concept, granules having an n_1 index (defined as material A) are represented with blue disks and the ones having an n_3 index (defined as material B) are represented with red ones.

As a picture shows, the A material starts from the 100% of content at the beginning of the progression area (left side of the Fig. 7) and it decrease in a progressive and constant way until the 0% is reached at the end of said progression area (right side of the Fig. 7).

On the contrary, the B material starts from 0% of content at the beginning of the progression area and it reaches 100% at the end of said progression area. The A and B materials are thus merged together in an homogeneous and inversely progressive way.

The particular distribution at inversely variable and homogeneous proportions of the two kinds of A and B material granules, is obtained with a special mixer (this mixer is object of the present invention too) described in Fig. 8.

Said mixer puts the granules in a container having the size of the rough block progression area.

The mixing takes place by vertical drop of the granules, controlled by two feeding devices which are suitably grooved length wise and pick up the material from two different hoppers: an hopper for each of the two kinds of material.

The rotating speed of each of these two feeding devices, and therefore the input quantity of the material, is electronically driven in order to have a simultaneous fall of the two materials in inversely proportional quantities.

Said mixer is helped by a volumetric or ponderal dosing device and the mixing can be automatic or helped.

In Figure 9 there are graphically shown the variation of the speed of the feeding devices, in function of the time, and, consequently, the amounts of material A and B respectively settled.

In order to obtain the blocking of the settled granules, said granules must be moistened by capillarity with deionized water in the position in which they have been settled and then the whole moistened material is frozen.

In this way the progression portion can be handled without being subjected to deterioration or mixing and can be stored without time limit in a freezer.

For the preparation of the rough-block formed by three optical areas (portions) according to the invention, the three portions are composed in the melting pot,

namely:

- the portion consisting of the granules of index n_1 (granules of material A) for the far sight area,
- the progressive index portion, consisting of the previously frozen granules (A +B) for the intermediate sight area,
- the portion consisting of the granules of index n_3 granules of material B) for the near sight area.

For the manufacture of the optical glass rough blocks the total or partial melting occurs in an oven having controlled pressure and atmosphere (see Fig. 10).
Moreover, the melting-pot can be flat or meniscus shaped with basic curves in order to facilitate the mechanical working of the lens. Said meniscus shape can be also obtained during the rebaking of the rough-block by any means.
If necessary, more than three optical areas can be realized in the rough-block.
The grinding of the starting material (for instance glass) will take place with any means suitable for assuring the desired size of the granules by employing also a screening having differential volumetric measures and a forced depulverization.
All these technologies can be employed for all the production or only for some kinds of glass compositions.
For example, a prototype has been manufactured by using a 1.5 index glass for the far sight portion and a 1.7 index glass for the near sight portion. Both types of glass grinded in form of granules having 0.4 mm size were composed according to the method previously disclosed in order to obtain the progression portion. This progression portion in form of a block of mixed granules A + B, was then moistured and frozen.
The frozen mixed granules block was placed in a melting pot in order to form the progression portion (b) of the rough-block, whereas in portion (a) granules of material A and in portion (c) granules of material B were charged. The charged material was subsequently subjected to a merging through total or partial melting at 750°C in an oven having a high vacuum atmosphere. The melting apparatus is shown in figure 10.

CLAIMS

1. Progressive, multifocal ophthalmic lens made of glass or other optical material, characterized by the fact of having more optical areas among which the dioptric progression one is made of an optical material having a variable refraction index so that this progression area starting by an end having the refraction index value of the material forming the lens in the far sight area progressively reaches at the other end the refraction index of the material forming the lens in the near sight area, thus obtaining, when the lens surface is shaped according to monofocal curves, at least the following three optical areas:
- an optical area having dioptric value for far sight,
- an optical area having dioptric value for near sight,
- an optical progression area, placed between the far sight and the near sight, in which progression area the dioptric value changes from the far sight value to the near sight value owing to the continuous variation of the refractive index.

2. Method to obtain the leans according to claim 1 carried out by shaping the lens surface through spherical, toric, constant geometry curves that means in the same way in which the monofocal lenses are manufactured, starting from a "rough block" made of more different material areas, at least one area of which is characterized by the fact of having the variable refraction index as stated in claim 1.

3. Element made of glass or other optical material having a variable refraction index for optical and/or ophthalmic use.

4. Process for manufacturing the progressive, multifocal ophthalmic lens according to claim 1, starting from a rough-block of optical material which block shows at least three different optical areas, the first area, suitable for far sight, being made of optical material of refraction index n_1, the third area suitable for near sight being made of optical material of refraction index n_3, the second area placed between the first and the third area, suitable for intermediate distance sight being made of optical material of refraction index n_2 progressively changing from n_1 to n_3.

5. Process for manufacturing the ophthalmic lens according to claim 1 wherein the progression area, having variable refraction index ranging from the value n_1 to the value n_3, is obtained by feeding granules of material of refractive index n_1 and granules of material of refractive index n_3 in a container through a granules feeding device which controls the amount of the two material in a progressive varying ratio of the two materials and the settled mixture of the granules is subsequently subjected to a merging through melting treatment.

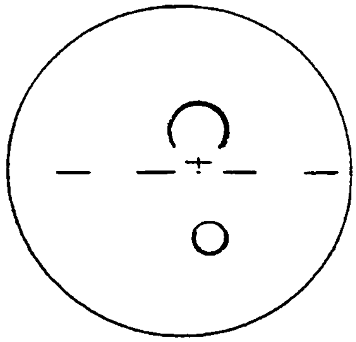
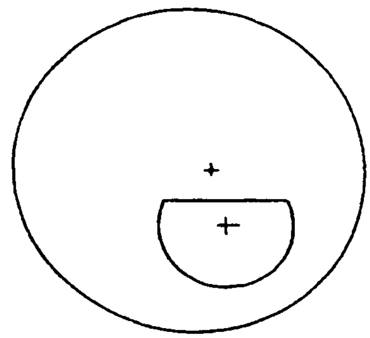


Figure 1

Figure 2



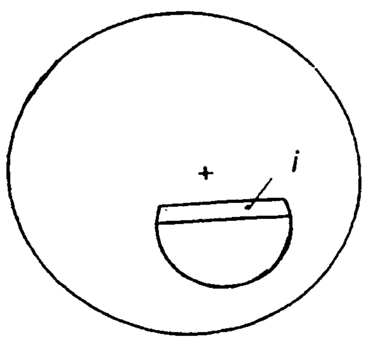


Figure 3

Figure 4

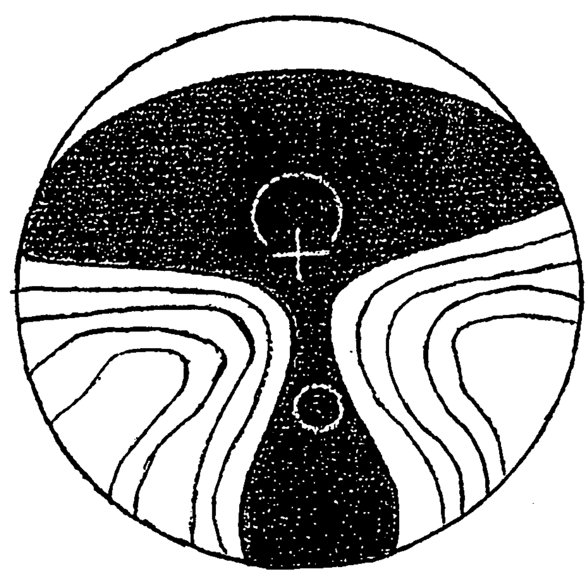


Figure 5

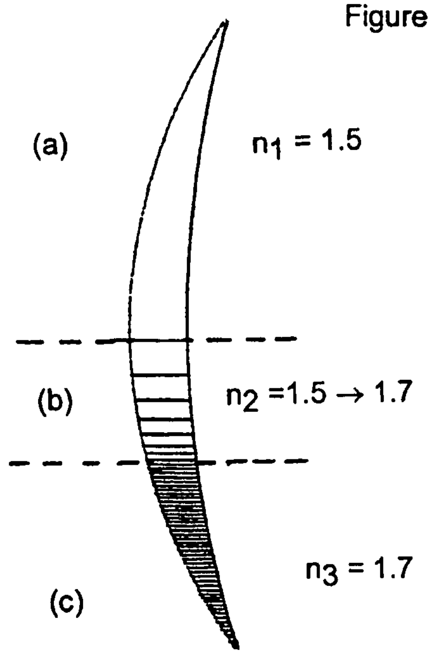


Figure 6

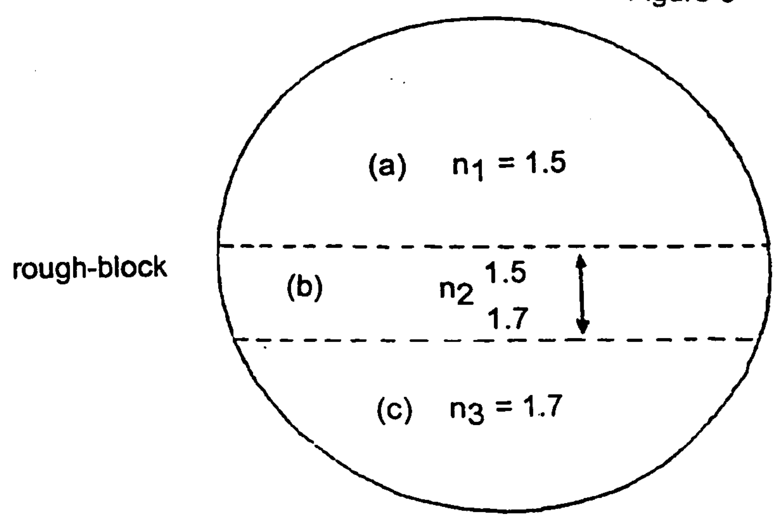


Figure 7

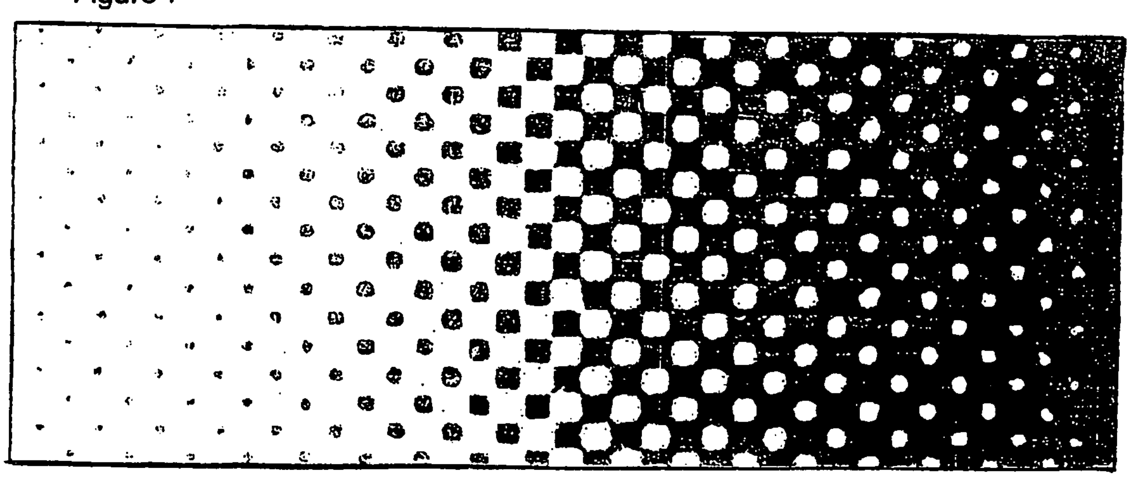


Figure 8

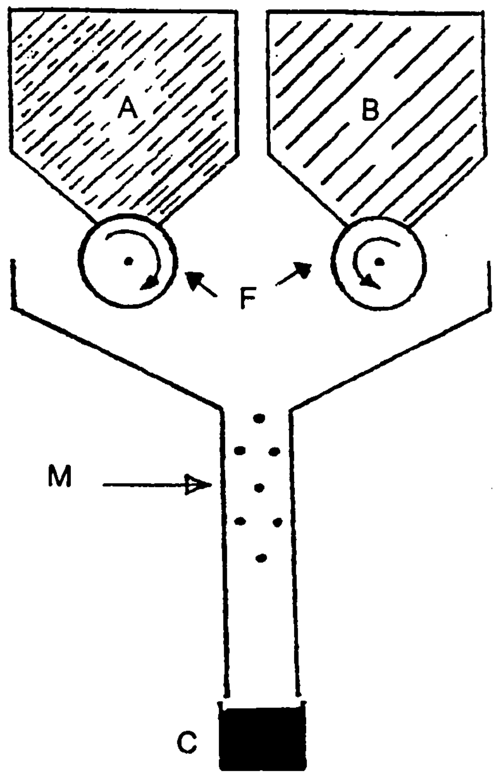


Figure 9

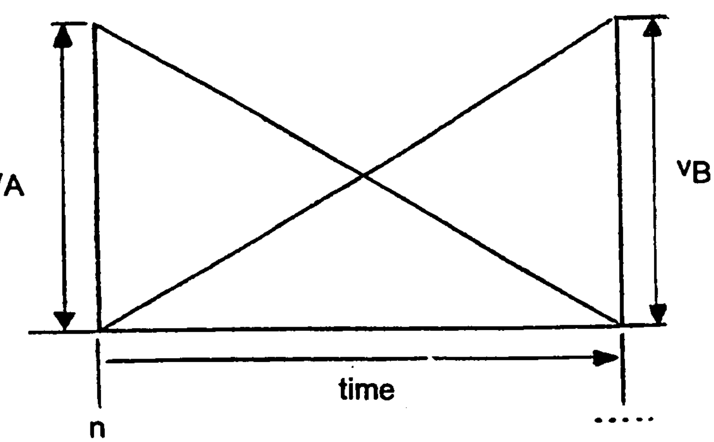


Figure 10

Apparatus for merging granules

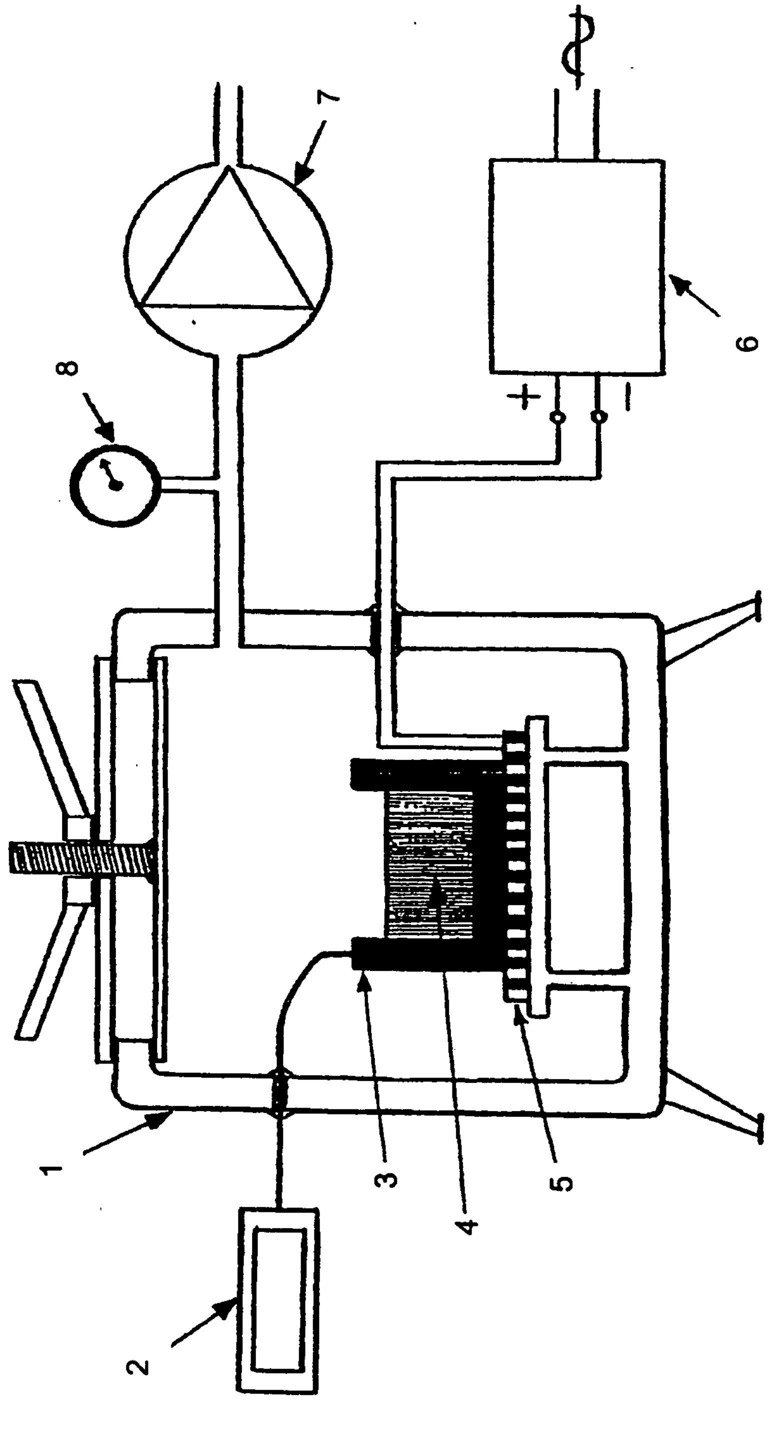


Figure 11

Maximum additions

Far sight diopters	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
0.00																	
0.25		●															
0.50		●	●														
0.75		●	●														
1.00		●	●	●													
1.25		●	●	●													
1.50		●	●	●	●												
1.75		●	●	●	●	●											
2.00		●	●	●	●	●	●										
2.25		●	●	●	●	●	●										
2.50		●	●	●	●	●	●	●									
2.75		●	●	●	●	●	●	●									
3.00		●	●	●	●	●	●	●	●								
3.25		●	●	●	●	●	●	●	●	●							
3.50		●	●	●	●	●	●	●	●	●	●						
3.75		●	●	●	●	●	●	●	●	●	●						
4.00		●	●	●	●	●	●	●	●	●	●	●					
4.25		●	●	●	●	●	●	●	●	●	●	●	●				
4.50		●	●	●	●	●	●	●	●	●	●	●	●	●			
4.75		●	●	●	●	●	●	●	●	●	●	●	●	●			
5.00		●	●	●	●	●	●	●	●	●	●	●	●	●	●		
5.25		●	●	●	●	●	●	●	●	●	●	●	●	●	●		
5.50		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
5.75		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6.00		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 98/05613

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G02B3/00 B29D11/00 C03B19/09 G02C7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G02B B29D C03B G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 26 928 A (GROEBER VOLKER DIPL ING ;GRAEFE GUENTER (DE)) 30 January 1997 see column 5, line 33 - column 7, line 37 ---	1-4
X	EP 0 318 035 A (RODENSTOCK OPTIK G) 31 May 1989 see page 4, line 23 - page 5, line 40 ---	1-4
X	EP 0 407 294 A (ESSILOR INT) 9 January 1991 see column 1, line 1 - column 2, line 49 ---	1-4
X	US 5 049 175 A (ROESS DIETER ET AL) 17 September 1991 see column 2, line 44 - column 4, line 36 -----	5

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 February 1999	23/02/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Sarneel, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 98/05613

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19526928 A	30-01-1997	NONE	
EP 0318035 A	31-05-1989	DE 3739974 A	08-06-1989
		AT 114059 T	15-11-1994
		AU 637282 B	20-05-1993
		AU 1311492 A	14-05-1992
		AU 2726888 A	14-06-1989
		DE 3852090 D	15-12-1994
		WO 8904986 A	01-06-1989
		ES 2063752 T	16-01-1995
		JP 2503362 T	11-10-1990
		US 5042936 A	27-08-1991
EP 0407294 A	09-01-1991	FR 2649397 A	11-01-1991
		AU 635042 B	11-03-1993
		AU 5872190 A	10-01-1991
		DE 69001587 T	07-10-1993
		JP 2834283 B	09-12-1998
		JP 3045613 A	27-02-1991
		US 5095079 A	10-03-1992
US 5049175 A	17-09-1991	DE 3240355 C	17-11-1983
		FR 2535307 A	04-05-1984
		GB 2129418 A,B	16-05-1984
		JP 59083942 A	15-05-1984
		NL 8302204 A	01-06-1984